

6/1. (As Filed) A network management architecture, comprising:
a master node, wherein
said master node is one of a plurality of nodes,
each of said nodes is communicatively coupled to another of said nodes by at
least one of a plurality of optical links,
said nodes comprise a network,
said master node is configured to manage said network by virtue of being
configured to perform a network management activity, and
said network management activity comprises at least one of discovery,
implementation, assurance, and restoration, of a virtual path.

7/1. (As Filed) The network management architecture of claim 6/1, wherein
said master node maintains topology information regarding a topology of said
network.

8/1. (As Filed) The network management architecture of claim 6/1, further
comprising:
a backup node, wherein
said backup node is configured to perform said network management activity, if a
failure in said network prevents said master node from performing said
network management activity.

9/1. (As Filed) The network management architecture of claim 8/1, wherein
said backup node maintains first topology information regarding a topology of said
network.

10/1. (As Filed) The network management architecture of claim 9/1, wherein
said master node maintains second topology information,
said master node is configured to update said first topology information by sending
said second topology information to said backup node.

11/6. (New) The network management architecture of claim ⁹~~4~~, wherein
 said master node maintains second topology information,
 said backup node is configured to update said first topology information by receiving
 said second topology information from said master node.

12/1. (New) The network management architecture of claim ⁸~~3~~, further comprising:
 a standby node, wherein
 said standby node is configured to perform said network management activity,
 if said failure prevents said master node and said backup node from
 performing said network management activity.

13/8. (New) The network management architecture of claim ¹²~~7~~, wherein
 said standby node maintains first topology information regarding a topology of said
 network.

14/8. (New) The network management architecture of claim ¹³~~8~~, wherein
 said backup node maintains second topology information,
 said backup node is configured to update said first topology information by sending
 said second topology information to said standby node.

15/10. (New) The network management architecture of claim ¹⁴~~9~~, wherein
 said master node maintains third topology information,
 said master node is configured to update said second topology information by sending
 said third topology information to said backup node.

16/11. (New) The network management architecture of claim ¹³~~8~~, wherein
 said backup node maintains second topology information,
 said standby node is configured to update said first topology information by receiving
 said second topology information from said backup node.

17/12. (New) The network management architecture of claim ¹⁶~~11~~, wherein
 said master node maintains third topology information,
 said backup node is configured to update said second topology information by

receiving said third topology information from said master node.

18/13. (New) The network management architecture of claim ¹²~~7~~, further comprising:
a plurality of standby nodes, wherein

said standby node is a one of said standby nodes, ?

each of said standby nodes is assigned a priority, and

said each of said standby nodes is configured to perform said network management activity, if said failure prevents said master node, said backup node and any ones of said standby nodes having a higher priority than said each of said standby nodes from performing said network management activity.

21 19/14. (New) The network management architecture of claim ¹⁸~~13~~, wherein
each of said standby nodes maintains first topology information regarding a topology of said network.

20 20/15. (New) The network management architecture of claim ¹⁹~~14~~, wherein
said backup node maintains second topology information,
said backup node is configured to update said first topology information by sending
said second topology information to said each of said standby nodes.

21 21/16. (New) The network management architecture of claim ²⁰~~15~~, wherein
said master node maintains third topology information,
said master node is configured to update said second topology information by sending
said third topology information to said backup node.

22 22/17. (New) The network management architecture of claim ¹⁹~~16~~, wherein
said backup node maintains second topology information,
said each of said standby nodes is configured to update said first topology information
by receiving said second topology information from said backup node.

23 23/18. (New) The network management architecture of claim ²²~~17~~, wherein
said master node maintains third topology information,
said backup node is configured to update said second topology information by

receiving said third topology information from said master node.

24/19. (New) A method for centralized control of a network, wherein said network comprises a plurality of nodes, comprising:

creating an authoritative topology database on a master node of said network, wherein each of said nodes is communicatively coupled to another of said nodes by at least one of a plurality of optical links,
said authoritative topology database contains topology information regarding a topology of said network,
said master node is configured to manage said network by virtue of being configured to perform a network management activity, and
said network management activity comprises at least one of discovery, implementation, assurance, and restoration, of a virtual path.

25/20. (New) The method of claim 24/19, wherein said creating said authoritative topology database comprises:

sending an IAM_MASTER message to a neighbor node, wherein said neighbor node is a neighbor of said master node.

26/21. (New) The method of claim 25/20, wherein said creating said authoritative topology database further comprises:

sending a positive reply from said neighbor node to said master node, wherein said reply comprises at least one of
a node identifier for said neighbor node,
a node type of said neighbor node, and
a system inventory for said neighbor node.

27/22. (New) The method of claim 26/21, wherein said creating said authoritative topology database further comprises:

forwarding said IAM_MASTER message from said neighbor node to another of said nodes.

28/23. (New) The method of claim 27/22, wherein said creating said authoritative

topology database further comprises:

sending another positive reply from said another of said nodes to said neighbor node,
wherein

said another positive reply comprises at least one of
a node identifier for said another of said nodes,
a node type of said another of said nodes, and
a system inventory for said another of said nodes.

21 29/24. (New) The method of claim ²⁴~~19~~, further comprising:
synchronizing said authoritative topology database and a topology database
maintained on one of said nodes.

30 25. (New) The method of claim ²⁹~~24~~, wherein said synchronizing comprises:
sending a copy of said authoritative topology database to said one of said nodes,
wherein
said one of said nodes is a backup node,
said backup node maintains said topology database, and
said backup node is configured to perform said network management activity,
if a failure in said network prevents said master node from performing
said network management activity; and
replacing said topology database with said copy of said authoritative topology
database.

31 26. (New) The method of claim ³⁰~~25~~, wherein said synchronizing further comprises:
sending a copy of said authoritative topology database to another of said nodes,
wherein
said another of said nodes is a standby node,
said standby node maintains another topology database, and
said standby node is configured to perform said network management activity,
if said failure prevents said master node, said backup node and any
ones of said standby nodes having a higher priority than said each of
said standby nodes from performing said network management activity;

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and
replacing said another topology database with said copy of said authoritative topology database.

32/31. (New) A method for determining a topology of a network, wherein said network comprises a plurality of nodes, comprising:
receiving a message at a node, wherein
said message is sent by a master node, and
each of said nodes is communicatively coupled to another of said nodes by at least one of a plurality of optical links;
forwarding said message to a neighbor node, wherein said neighbor node is a one of said nodes that is a neighbor of said node; and
sending a positive reply to said master node.

33/32. (New) The method of claim 32/31, wherein said node and said master node are ones of said nodes.

34/32. (New) The method of claim 32/31, wherein said message is an IAM_MASTER message.

35/32. (New) The method of claim 32/31, further comprising:
determining if said message can be forwarded.

36/35. (New) The method of claim 35/30, wherein said determining if said message can be forwarded comprises:
updating a hop count of said message;
comparing said hop count to a maximum hop count; and
forwarding said message if said comparison indicates that said message can be forwarded.

37/32. (New) The method of claim 32/31, further comprising:
comparing a version number of an executable image stored at said node and a version number in said message corresponding to said executable image.

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~~38~~ 33. (New) The method of claim ~~32~~, further comprising:
making a list of executable images stored at said node that require updating.

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~~39~~ 34. (New) The method of claim ~~32~~, further comprising:
if said comparison indicates that said executable image stored at said node requires
updating,
requesting said master node forward a replacement executable, wherein said
replacement executable is a copy of an executable ^{image?} stored at said master
node corresponding to said executable image stored at said node, and
replacing said executable image stored at said node with said replacement executable.?

³²
~~40~~ 35. (New) The method of claim ~~31~~, further comprising:
determining if a master node identified in said message is a master node identified in
another message received by said node;
analyzing a hop count and a source node identified in said message, if said master
node identified in said message is said master node identified in said another
message, and
analyzing a node identifier of said master node identified in said message, otherwise.

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~~41~~ 36. (New) The method of claim ~~36~~, wherein said analyzing said hop count and said
source node identified in said message comprises:

performing a first comparison between said hop count identified in said message and a
hop count identified in said another message;
performing a second comparison between said source node identified in said message
and a source node identified in said another message; and
dropping said message, if either of said first and said second comparisons fail, and
determining if said message can be forwarded, otherwise.

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~~42~~ 37. (New) The method of claim ~~36~~, wherein said determining if said message can
be forwarded comprises:

updating a hop count of said message;
comparing said hop count to a maximum hop count; and

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forwarding said message if said comparison indicates that said message can be forwarded.

43/38. (New) A method for maintaining topology information regarding a topology of a network, wherein said network comprises a plurality of nodes, comprising:
 sending a message from a master node to a backup node, wherein
 each of said nodes is communicatively coupled to another of said nodes by at least one of a plurality of optical links;
 receiving a reply from said backup node at said master node;
 comparing information in said reply regarding a backup database maintained on said backup node with information regarding an authoritative database maintained on said master node; and
 sending a copy of said authoritative database from said master node to said backup node, if said comparison indicates that said backup database should be updated.

44/39. (New) The method of claim 43/38, wherein said backup node and said master node are ones of said nodes.

45/40. (New) The method of claim 43/38, further comprising:
 receiving said copy of said authoritative database at said backup node; and
 replacing said backup database with said copy of said authoritative database.

46/41. (New) The method of claim 44/39, further comprising:
 forwarding said copy of said backup database from said backup node to a standby node.

47/42. (New) The method of claim 43/38, further comprising:
 sending a copy of a dynamic database from said master node to said backup node.

48/43. (New) The method of claim 47/42, further comprising:
 forwarding said copy of said dynamic database from said backup node to a standby node.

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⁴³
49/44. (New) The method of claim ~~38~~, further comprising:

forwarding said copy of said backup database from said backup node to a standby node;

storing said copy of said backup database as a standby database.

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50/45. (New) The method of claim ~~44~~, further comprising:

maintaining synchronization between said authoritative database, said backup database and said standby database.

⁵¹
51/46. (New) A method for adding a path in a network, wherein said network comprises a plurality of nodes, comprising:

performing path discovery at a master node, wherein

each of said nodes is communicatively coupled to another of said nodes by at least one of a plurality of optical links,

said path discovery is performed by a route processor associated with said master node,

said path discovery is performed to identify said path, and

said path is between a source node of said nodes and a destination node of said nodes; and

if said path is successfully discovered,

adding said path to a topology database, and

[sending an update message to a backup node, said update message comprising information regarding said path.

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52/47. (New) The method of claim ~~46~~, wherein said backup node and said master node are ones of said nodes.

⁵¹
53/48. (New) The method of claim ~~46~~, further comprising:

sending a positive response from said route processor to a system controller of said master node, if said path is successfully discovered.

⁵³
54/49. (New) The method of claim ~~48~~, wherein said positive response comprises: an ordered list of hops, wherein said ordered list of hops represents said path, and said

path is between said source and said destination nodes; and
a connection identifier, wherein said connection identifier uniquely identifies said path within said network.

⁵⁵~~50~~. (New) The method of claim ⁵⁴~~49~~, further comprising:
sending another positive response to said requestor, if said positive response is received by said system controller, ^{AB}and
sending a negative response to said requestor, otherwise.

⁵⁶~~51~~. (New) The method of claim ⁵¹~~46~~, further comprising:
sending information regarding said path to others of said nodes, if said path is successfully discovered.

⁵⁷~~52~~. (New) The method of claim ⁵⁶~~51~~, wherein each of said others of said nodes is a standby node.

⁵⁸~~53~~. (New) The method of claim ⁵⁶~~51~~, wherein said information regarding said path comprises an I/O map.

⁵⁹~~54~~. (New) The method of claim ⁵⁶~~51~~, further comprising:
communicating a reconfiguration message to ones of said nodes, said path comprising said ones of said nodes, if said path is successfully discovered.

⁶⁰~~55~~. (New) A method for deleting a path in a network, wherein said network comprises a plurality of nodes, comprising:

receiving a deletion request at a route processor of a master node, wherein
said deletion request comprises a connection identifier,
said connection identifier identifies said path,
said path is between a source node of said nodes and a destination node of said nodes,
said path comprising a plurality of said nodes,
said plurality of said nodes comprises said source and said destination nodes,
and

each of said nodes is communicatively coupled to another of said nodes by at least one of a plurality of optical links;
communicating a reconfiguration message to each of said plurality of said nodes; and deleting said path from a topology database, if said path is successfully deleted.

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~~61~~ 56. (New) The method of claim ~~55~~, further comprising:

sending an update message to a backup node, said update message comprising information regarding said path, if said path is successfully deleted.

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~~62~~ 57. (New) The method of claim ~~56~~, wherein said backup node and said master node are ones of said nodes.

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~~63~~ 58. (New) The method of claim ~~56~~, further comprising:
determining if said connection identifier is valid; and
sending a negative response from said route processor to a system controller of said master node, if said connection identifier is not valid.

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~~64~~ 59. (New) The method of claim ~~56~~, further comprising:
sending a positive response from said route processor to a system controller of said master node, if said path is successfully deleted.

⁶⁴
~~65~~ 60. (New) The method of claim ~~59~~, further comprising:
sending another positive response to said requestor, if said positive response is received by said system controller, and
sending a negative response to said requestor, otherwise.

⁶⁰
~~66~~ 61. (New) The method of claim ~~59~~, further comprising:
communicating a reconfiguration message to ones of said nodes, said path comprising said ones of said nodes, if said path is successfully deleted.

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~~67~~ 62. (New) A method for changing a path in a network, wherein said network comprises a plurality of nodes, comprising:
receiving a connectivity change request at a master node, wherein

said path is between a source node of said nodes and a destination node of said nodes,

said path comprising a plurality of said nodes,

said plurality of said nodes comprises said source and said destination nodes,

and

each of said nodes is communicatively coupled to another of said nodes by at

least one of a plurality of optical links;

determining if ones of said nodes affected by said connectivity change request can be configured to effect said connectivity change request; and

updating a topology database to reflect a change in said path effected by said connectivity change request, if said ones of said nodes affected by said connectivity change request can be configured to effect said connectivity change request.

Q1 68/63. (New) The method of claim 67, wherein said determining is based on at least one of:

a current state of said network,

a service available in said network, and

a service requested in said connectivity change request.

69/64. (New) The method of claim 67, wherein said determining comprises: sending a notification from said master node to said source node, for example, to initiate the identification of a new physical path.

70/65. (New) The method of claim 69, wherein said sending determining further comprises:

initiating identification of a new physical path from said source node.

71/66. (New) The method of claim 67, wherein said connectivity change request comprises a connection identifier, and said connection identifier identifies said path.

72⁶⁷/₆₁. (New) The method of claim ⁶⁷~~62~~, further comprising:

sending an update message to a backup node, said update message comprising information regarding said path, if said ones of said nodes affected by said connectivity change request can be configured to effect said connectivity change request.

73⁷²/₆₈. (New) The method of claim ⁷²~~61~~, wherein said backup node and said master node are ones of said nodes.

74⁶⁷/₆₉. (New) The method of claim ⁶⁷~~62~~, further comprising:
communicating a reconfiguration message to said ones of said nodes affected by said connectivity change request, if said ones of said nodes affected by said connectivity change request can be configured to effect said connectivity change request.

75⁷⁴/₇₀. (New) The method of claim ⁷⁴~~69~~, further comprising:
committing a connectivity change requested in said connectivity change request, if said ones of said nodes affected by said connectivity change request can be configured to effect said connectivity change request.

76⁶⁷/₇₁. (New) The method of claim ⁶⁷~~62~~, further comprising:
sending a positive response from said master node, if said ones of said nodes affected by said connectivity change request can be configured to effect said connectivity change request.

77⁷⁶/₇₂. (New) The method of claim ⁷⁶~~71~~, further comprising:
communicating a reconfiguration message to said ones of said nodes affected by said connectivity change request, if said master node sends a positive response.

78⁷⁷/₇₃. (New) The method of claim ⁷⁷~~72~~, further comprising:
committing a connectivity change requested in said connectivity change request, if said master node sends a positive response.